NASA TECH BRIEF

NASA Headquarters

Preparation of Stable Colliodal Dispersions in Fluorinated Liquids

The problem:

It is desirable to separate oil from water by a liquid barrier whose position can be controlled by a magnetic field.

The solution:

Fluorocarbon liquids are immiscible with both water and oils. A colloidal suspension of a magnetic solid (magnetite) in a fluorocarbon liquid can be made with the aid of a fluorinated surfactant. The resulting liquid will not mix with either water or oil and will be affected by a magnetic field.

How it's done:

A stable dispersion is prepared by wet grinding, in a ball mill half-filled with steel balls, from the following three ingredients:

(1) 1 volume magnetite powder;

(2) 2.5 volumes hexafluoropropylene oxide (HFPO) polymer carboxylic acid;

$$F(\overset{\overset{CF_3}{|}}{CF}-CF_2-O)_n-\overset{\overset{CF_3}{|}}{\underset{\underset{F}{|}}{C}}-COOH,$$

where n is 15 but may be $\geq$ 12; and

(3) 30 volumes of a fluorinated ether polymer:

$$F(\overset{\overset{CF_3}{|}}{CF}-CF_2-O)_n-\overset{\overset{CF_3}{|}}{\underset{\underset{F}{|}}{C}}-H,$$

where n = 3.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
NASA Headquarters
Code KT
Washington, D.C. 20546
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Patent status:

No patent action is contemplated by NASA.

Source: Robert Kaiser of
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